

3 a hollow needle having an inner lumen, a sharpened distal end
4 for penetrating tissue and a proximal end adapted to receive a syringe,
5 a stylet having proximal and distal ends, being positioned within
6 the inner lumen of said needle and being spaced from the interior of said
7 needle to facilitate back flow of blood when a blood vessel is penetrated,
8 the stylet including an ultrasound transducer supported at [one] the
9 distal end for transmitting and receiving ultrasonic waves through the
10 sharpened end of said needle,

11 [a support rod for supporting said transducer, means attaching
12 said transducer to said support rod, coaxial] electrical conductors
13 associated with said [support rod] stylet for transmitting electrical
14 signals to and from said transducer, including a [wire] first conductor
15 extending through said [support rod] stylet electrically connected with
16 a back surface of said transducer, and a [metal] second conductor on the
17 surface of said [rod] stylet electrically [interconnected] connected with a
18 front surface of said transducer[, said metal conductor and support rod
19 being spaced from said needle to facilitate back flow of blood when a
20 blood vessel is penetrated], and

21 a syringe portion detachably attached to the proximal end of said
22 needle.

14
In claim 6, line 1, change [trocar] to --stylet--

Please add the following new claims:

8 ~~7.~~ Apparatus for use in cannulation of blood vessels comprising
a hollow needle having an inner lumen, a sharpened distal end for
penetrating tissue
a stylet having proximal and distal ends, being positioned within the
inner lumen of said needle, having an inner lumen to facilitate back
flow of blood when the distal end of the needle is disposed within the
blood vessel, the stylet including an ultrasound transducer means
supported at the distal end of the stylet for transmitting and receiving
ultrasonic waves through the sharpened end of said needle,
electrical conductors associated with said stylet for transmitting
electrical signals to and from said transducer means, including a first
conductor having a cylindrical shape and being electrically connected
with a first surface of said transducer means, and a second conductor
being electrically connected with a second surface of said transducer.

9 ~~8.~~ The apparatus of claim ~~7~~ wherein the stylet has an inner lumen
extending longitudinally therein formed by the cylindrically shaped conductor
and the ultrasound transducer means is secured to the end of the cylindrically
shaped conductor.

1 ¹⁰
~~9.~~ ⁹ The apparatus of claim ~~8~~ wherein the ultrasound transducer
2 means has a circular shape.

1 ¹¹
~~10.~~ ¹⁰ The apparatus of claim ~~9~~ wherein the ultrasound transducer
2 means has a central aperture which is in communication with the inner lumen
3 of the stylet.

1 ¹²
~~11.~~ ⁸ The apparatus of claim ~~7~~ wherein the stylet is disposed within the
2 inner lumen of the hollow needle with the second conductor electrically
3 connected to the hollow needle.

1 ¹³
~~12.~~ ⁸ The stylet of claim ~~7~~ wherein the second conductor is stainless
2 steel tubing.

1 ¹⁴
~~13.~~ ⁸ The stylet of claim ~~7~~ wherein a syringe is releasably secured to
2 the proximal end of the needle.

1 ¹⁵
~~14.~~ A method for guiding a hollow needle through tissue into a blood
2 vessel of a patient comprising:

3 a) providing an apparatus which includes:
4 a hollow needle having an inner lumen, a sharpened
5 distal end for penetrating tissue and a proximal end,

Al³
cont.

6 an elongated stylet having proximal and distal ends
7 positioned within the inner lumen of said needle and
8 including an ultrasonic transducer means secured to the
9 distal end of the stylet for transmitting and receiving
10 ultrasonic waves through the sharpened distal end of said
11 needle having a front surface and a rear surface, electrical
12 conductors associated with said stylet for transmitting
13 electrical signals to and from said transducer means,
14 including a first electrical conductor extending through the
15 interior of the stylet and being electrically connected to one
16 surface of said transducer means, and a second electrical
17 conductor being electrically connected to a second surface
18 of said transducer means;

19 b) penetrating the skin of the patient with the sharp distal
20 end of the needle and advancing the needle through the tissue of the
21 patient;

22 c) emitting ultrasonic waves from the ultrasound transducer
23 means on the distal end of the stylet, receiving reflected ultrasonic
24 waves by said transducer means and generating a signal representing
25 the reflected ultrasonic waves; and

26 d) adjusting the direction of the distal sharpened end of the
27 needle as it is advanced through the patient's tissue based upon the

28 received ultrasonic waves to direct the sharpened distal end of the
29 needle into a blood vessel of the patient, the approach of the needle to
30 a blood vessel characterized by an increase in the intensity of the signals
31 representing the reflected ultrasonic waves and the positioning of the
32 sharpened distal end of the needle within a blood vessel characterized
33 by a substantial increase in the signal representing the reflected
34 ultrasonic waves.

6³
cont. 1 ¹⁴
~~15.~~ ¹⁵ The method of claim 14 wherein a syringe is secured to the
2 proximal end of the needle and a back pressure is applied on the syringe to
3 effect a negative pressure within the needle to create a back flow of blood into
4 the syringe when the sharpened distal end of the needle is disposed within a
5 blood vessel.

1 ¹⁷
~~16.~~ An apparatus for use in the cannulation of a blood vessel
2 comprising:

3 a hollow needle having an inner lumen, a sharpened distal end
4 for penetrating tissue and a proximal end, and

5 a stylet having proximal and distal ends, being positioned within
6 the inner lumen of said needle and being spaced from the interior of said
7 needle to facilitate back flow of blood when the needle is positioned
8 within a blood vessel, the stylet including an ultrasound transducer

9 means supported at the distal end of the stylet for transmitting and
10 receiving ultrasonic waves through the sharpened end of said needle
11 electrical conductors associated with said stylet for transmitting
12 electrical signals to and from said transducer means, including a first
13 conductor extending through said stylet electrically connected with a
14 first surface of said transducer, and a second conductor disposed about
15 the first conductor electrically connected with a second surface of said
16 transducer means.

18 17
17. The apparatus of claim 16 wherein a syringe is releasably secured
2 to the proximal end of the needle.

19 17
18. The apparatus of claim 16 wherein the first conductor has a
2 cylindrical shape, is disposed about the second conductor and is connected to
3 the front surface of the transducer means and the second conductor is
4 connected to the back surface of the transducer means.

19 17
19. The apparatus of claim 1 wherein the first conductor has a
2 cylindrical shape, is disposed about the second conductor and is connected to
3 the front surface of the transducer means and the second conductor is
4 connected to the back surface of the transducer means.

1 20. A stylet having proximal and distal ends adapted to positioned
2 within an inner lumen of a needle and dimensioned to be spaced from the
3 interior of said needle to facilitate back flow of blood when the needle is
4 positioned within a blood vessel, the stylet comprising:

5 a) an elongated body having proximal and distal ends;

6 b) an ultrasound transducer means supported at the distal end
7 of the elongated body for transmitting and receiving ultrasonic waves
8 through the sharpened end of said needle; and

9 c) electrical conductors associated with said stylet for
10 transmitting electrical signals to and from said transducer means,
11 including a first conductor wire extending through said stylet which is
12 electrically connected with a rear surface of said transducer means, and
13 a second conductor of essentially cylindrical shape disposed about the
14 first conductor electrically connected with a front surface of said
15 transducer means.

1 ²¹
2 ~~22~~ The stylet of claim ²⁰~~21~~ wherein solid insulation is disposed
3 between the first and second conductors.

1 ²²
2 ~~23~~ A kit for use in the cannulation of a blood vessel comprising:
3 a) a hollow needle having an inner lumen, a sharpened distal
4 end for penetrating tissue and a proximal end; and

4 b) a stylet having proximal and distal ends adapted to be
5 positioned within the inner lumen of said needle and being spaced from
6 the interior of said needle to facilitate back flow of blood when the
7 needle is positioned within a blood vessel, the stylet including an
8 ultrasound transducer means supported at the distal end of the stylet
9 for transmitting and receiving ultrasonic waves through the sharpened
10 end of said needle, electrical conductors associated with said stylet for
11 transmitting electrical signals to and from said transducer means,
12 including a first conductor extending through said stylet electrically
13 connected with a first surface of said transducer, and a second conductor
14 disposed about the first conductor electrically connected with a second
15 surface of said transducer means.

REMARKS

The patentees respectfully request that the above amendments to the specification and the claims, including the addition of new claims, be considered by the Examiner during the initial examination of this application. It is believed that the amended and the new claims define patentable subject matter and consideration and an early allowance thereof are respectfully requested.